Effect of Dosage on Length of Incubation Period of Aster-Yellows Virus in its Vector. (18327)

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The vector of aster-yellows, *Macrosteles divisus* Uhler, may become infective through feeding on a diseased plant(1) or by receiving an injection of juices from leafhoppers that had fed on a diseased plant some days previously(2). In either case, the vector is unable to transmit virus to healthy plants immediately after acquiring it. An interval of several days, often referred to as an incubation period of the virus in the leafhopper, must elapse between the time when the insect first acquires virus and the time when it can first transmit virus to healthy plants. An attempt was made to determine whether or not there was a relationship between the amount of virus injected and the length of the incubation period in the leafhopper.

Procedure. One hundred infective leafhoppers were crushed at 0°C in a glass micromortar and the pulp diluted to 10^{-1} and 10^{-3} with 0.25 M neutral buffered saline. Two hundred non-viruliferous insects, immobilized by a temperature of 0°C, were injected with each dilution. The volume of inoculum, 1/8000 cc per insect, was delivered by a specially calibrated microsyringe. The surviving injected vectors were kept under controlled light (1500 foot candles), constant wind velocity and humidity, at 25°C ± 0.5°C. Non-injected insects from the same stock served as controls. The leafhoppers were caged on young asters in colonies of 5 and transferred daily to new sets of healthy plants. With a dilution of 10^{-1} the shortest incubation periods of 3 infective colonies were 11, 14, and 15 days, respectively. With a dilution of 10^{-3} the minimal incubation periods were 24, 28, and 38 days, respectively. A similar relationship was described earlier for the wound-tumor virus(3) and for the animal viruses causing rabbit papilloma(4) and encephalomyelitis of mice(5). In the latter instance the incubation period was used as a measure of virus activity.

The results of the experiments with aster-yellows virus can be interpreted on the same basis as those with animal viruses, that is, on the fact that multiplication of a small amount of virus would take a longer time to render the insects infective than multiplication of a greater amount. This interpretation is in full agreement with earlier evidence on the multiplication of this plant virus in its insect vector(6-9). It is expected that more extensive experiments will show that the correlation, between amount of virus injected and length of incubation period of virus in the leafhopper, will provide a fairly accurate measure of aster-yellows virus concentration in leafhopper juice samples.

Summary. Juices from viruliferous *Macrosteles divisus* Uhler were diluted to 10^{-1} and 10^{-3} with saline and 1/8000 cc per insect was injected into non-viruliferous leafhoppers. The infectivity tests of injected vectors under controlled environmental conditions showed that with a dilution of 10^{-1} the shortest incubation periods were from 11 to 15 days. With a dilution of 10^{-3} the minimal incubation periods were from 24 to 38 days. The results can be interpreted on the basis of the fact that multiplication of a small amount of virus would take a longer time to render the insects infective than multiplication of a greater amount of the aster-yellows virus.

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